CHAPTER 2 GENERAL CLASSIFICATION PERSPECTIVES

2.1 Introduction

Classification is a process that is common in many disciplines and in everyday life. In essence classification is based on concepts, generally defined as an idea underlying a class of things (Hornby 1981), and on the attributes of such concepts or entities (things). The identification of the attributes of an entity may be viewed as taking some form of measurement to determine the relevant attributes. Equally important in the process of classification is how attributes of entities or objects change over time, indicating that time has to be taken into account in the process of classification. Another important aspect that comes into play is the relationships among the various entities since relationships may lead to the creation of new knowledge.

2.1.1 Goal of this chapter

The aim of this chapter is to discuss general classification perspectives in order to shed some light on classification and some underlying problems. Classification is not only practised in accounting, but is ubiquitous in many areas in life. It follows, therefore, that one needs to investigate classification issues in other disciplines. In particular, research into domain-specific classifications may lead a classifier to a broader understanding of classification principles.

2.1.2 Layout of this chapter

In this chapter classification as a process of the mind and the historical origins of the process of classification are presented in sections 2.2 and 2.3. Some definitions of classification are presented in Section 2.4, followed by basic concepts of classification with specific reference to the purpose and properties of a generic classification in Section 2.5. Some basic building blocks, namely, the role of relationships, concepts and change in classification are addressed in Section 2.6. Various viewpoints of classification in a number of disciplines are examined in Section 2.7. These disciplines are: social sciences (philosophy, psychology and human information processing); knowledge creation; science (logic and quantum physics) and auditing. Towards the end of the chapter a discussion on the role of measurement, risks and uncertainty is presented. A summary concludes the chapter.

A visual representation of Chapter 2 appears in Figure 2.1.

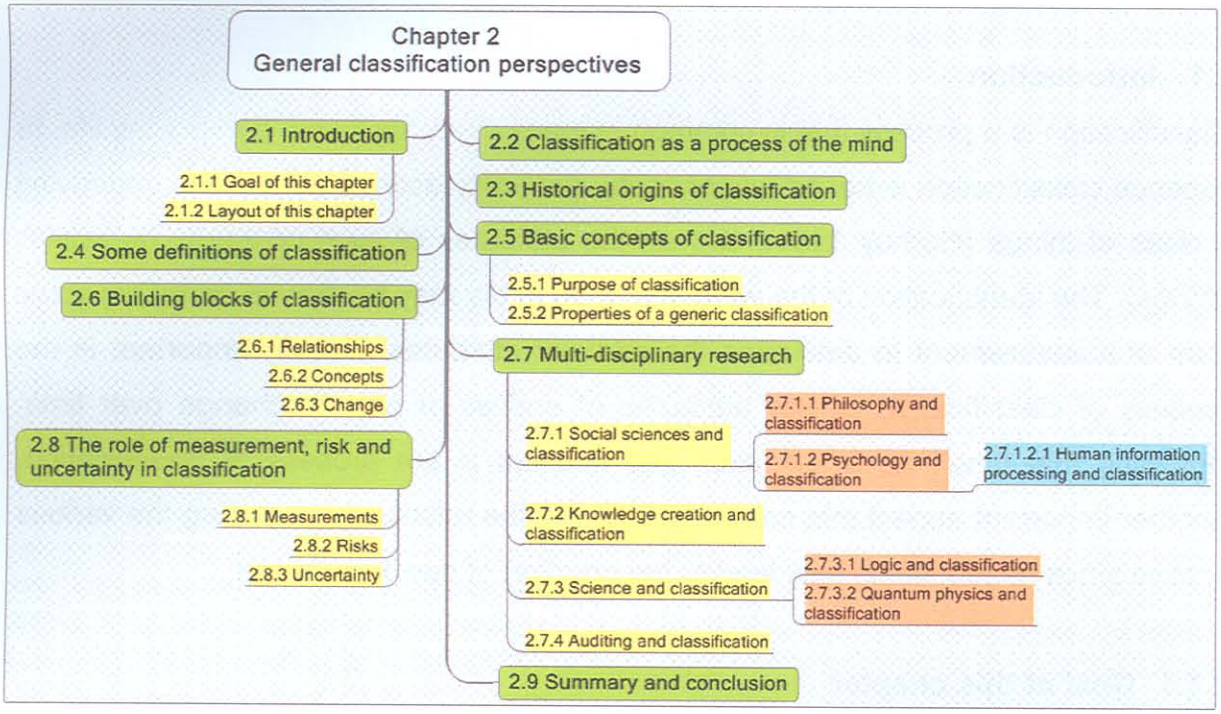

Figure 2.1 A visual representation of the layout of Chapter 2

2.2 Classification as a process of the mind

The grouping of everyday information is a natural activity of the brain of most living beings. Classification is performed by fixing patterns and then fitting such patterns on future events, objects, etc. (De Bono 1985). Capra (2002) states that such organising activity – in other words, classification – performed by living systems is a mental activity. The right hemisphere of the brain is used for visual activities and the grouping of objects and other entities (Johnson 1998). The right hemisphere takes information about an object, groups it and recognises it, as, for instance, a *chair* or a *car*. The left hemisphere of the brain is responsible for conducting analytical activities, e.g. identifying the car as *Juan's car* by recognising, for example, the registration number. The process of classification, therefore, settles in the right hemisphere of the brain.

Stevens (1951:740) reports that in psychology most experiments on "inductive concept formation" are experiments on classification. The people involved in the experiment eventually extract common characteristics among certain stimuli and thereby discover that such stimuli are to be grouped together based on their mutual

properties or attributes. All these stimuli with the same attributes ought to be ranked together under one name. Looking ahead at the rest of this thesis, one can argue that the classification of accounting information should be based on the grouping together of common attributes and establishing relationships to enable the reporting of useful information.

2.3 Historical origins of classification

Classification has its roots in the works of the Greek philosopher Aristotle who lived from 382 to 322 BC (Berkeley 2004; Johnson 2004; Pauw 2004). Aristotle's classification scheme was based on nature, but his basic ideas could equally be applied to other areas. For example, the study of mathematics could be classified into calculus (continuous functions, differentiation, integration, etc.) and discrete mathematics (set theory, relations and functions, etc.) (Ensley and Crawley 2005). Naturally one has to look at the attributes of these objects to decide in which group an object is to be classified.

2.4 Some definitions of classification

Stevens (1951) defines classification as the creation of classes containing objects or events whose characteristics or behaviour can be shown to be equivalent. These classes are often referred to as equivalence classes in discrete mathematics (Ensley and Crawley 2005). Hornby (1981) shares Stevens' definition of classification when he defines it as the process of "arranging into groups". In general, to establish a comprehensive classification framework, all the attributes of every item, concept and event in the system under consideration may need to be identified. Naturally in practice this could be hard to achieve since some attributes may not be known when the classification is first performed. Furthermore, the obligation rests with the classifier to show that the attributes of these objects or events in a particular class are indeed equivalent for each member of the class.

2.5 Basic concepts of classification

In this section some basic concepts of classification are discussed with reference to the purpose of classification as well as the properties of a generic classification.

2.5.1 Purpose of classification

Broadly speaking, the purpose of a classification exercise is to group similar entities or members together in a collective and to give it a unique name. Instead, therefore, of referring to each member of the collective individually, one simply refers to the collective as a whole, armed with the knowledge that all individuals in the collective have the same attributes. As a result, classification is often performed for the purpose of convenience (Paton 1962; Chambers 1966). The demarcation of individuals into classes may, however, be open to criticism if all reasonable purposes for which a newly classified system is to be used afterwards, are not taken into account. For example, in accounting the information in financial statements ultimately serves a different purpose for each stakeholder and such, often conflicting, requirements of stakeholders should be identified when a classification framework for accounting information is conceptualised. A possibility is to calculate a distributed union of the requirements of all such stakeholders, minus the conflicting requirements. Example 1.1 in Chapter 1 illustrates such a scenario.

Classification is often based on the criteria of "social convenience and necessity" instead of the essential attributes of the members under consideration (Hayakawa 1964:215). Such social convenience and necessity requirements may result in a very different classification as would have been the case had the classification been done according to the differences and similarities of the various members. Accounting information is made available to different kinds of users who may all have different social convenience and necessity requirements. This may call for a different classification system. Still, if a single classification framework is to be used, a possible solution to the problem of conflicting requirements is to take a distributed union of all requirements and then remove from the union those that are in conflict with any other requirement.

Next, consideration is given to some properties of a well-classified system, suggested by Nobes and Parker (2002).

2.5.2 Properties of a generic classification

Nobes and Parker (2002) give the following guidelines and properties of a well-classified system:

1. Attributes of the members to be partitioned into classes should be adhered to consistently.
2. A sufficient number of subsets should be available to exhaust a given universe.
3. The classification must be a *partition*, i.e. each and every element must belong to a subset and all subsets will be mutually exclusive in such a way that no element may fall into more than one subset.
4. The specialisation of entities should obey a hierarchical integrity. In this regard an example from Rumbaugh (1996) is in order: the set of all triangles should be classified into the correct generalisation, namely, all geometric shapes.

Adherence to the above guidelines and properties may result in a useful *generic* classification framework by resolving possible contradictions where members could belong to more than one subset (see points 3 and 4 above). If the above guidelines are followed in a classification framework for accounting information, the existence of accounting hybrids (i.e. transactions that have attributes of more than one subset) could be reduced.

2.6 Building blocks of classification

In this section consideration is given to some basic building blocks of classification, namely, relationships, concepts and the role of change. All these play a vital role in developing a useful classification system.

2.6.1 Relationships

Relationships may be viewed as a special kind of glue that binds together two or more entities. Bateson (1980) calls a relationship between entities "the pattern that connects" and urges researchers to start focussing on relationships as the basis of definitions for entities. The definitions given to the various building blocks of a classification system should, therefore, take cognisance of all relevant relationships among the said entities.

When searching for relationships among items one considers common attributes that ultimately define a particular item. Often in this process, attributes may be discovered with relationships to other occurrences and facts, which may lead to the creation of new knowledge. The following example from accounting illustrates this point.

Example 2.1

Suppose a transaction has the properties (Λ indicates a logical *and*):

Continuing operation Λ Regular Λ Entry (real transaction) Λ Immediate Λ Recurring

A transaction which has the five attributes above (i.e. continuing, regular, entry, immediate and recurring) may be classified as an *other expense* which is a subcategory of continuing operations in the income statement. (Note that this classification holds when the transaction is first recorded in the past. For present and future time the transaction may be classified differently). Hence, by identifying the attributes of a transaction, an accountant may be lead to classifying the transaction as (for example) an *other expense*. In essence, therefore, new knowledge has been created.

End of Example 2.1

The point illustrated in Example 2.1 is agreed on by Goldberg (2001:45) when he writes: "The scrutiny of characteristics [attributes] for possible significant relationships is often a useful intellectual instrument". The correct classification of items in the financial statements based on their relationships with other items (as determined by their common attributes) may lead to the creation of new knowledge about the company, as in Example 2.1.

The initial identification of relationships may sometimes be partial since some of these relationships could be deeply hidden or simply unknown, even throughout the entire classification exercise (Capra 2002). Therefore, when classification takes place it is plausible that only specific characteristics and their relationships to each other may be included. A classifier's understanding of the relevant relationships is often based on how he/she perceives reality in the sense described by Prigogine and Stengers (1984:227): "Only our ignorance … prevented us from achieving a complete

description of reality". This ignorance may be based on hidden variables and in classification reality may, therefore, not be revealed in total because of hidden variables or relationships. Lazarsfeld (1958) made a similar observation by claiming that certain characteristics of objects are chosen and relationships are determined between objects because normally only a *strict* subset of all characteristics of objects are studied in full in any science. Turning to the subject domain of this thesis: If the relevant attributes and relationships are not clearly identifiable, the information contained in the financial statements of a company may not be optimally useful.

The search for whether a relationship exists between two object occurrences or variables (by looking at their common attributes) is a way to establish whether two or more phenomena are indeed components of the same system, i.e. whether they are closely linked in the same system (Simon 1978). Gordon (1999:1) shares this view when he states that the process of classification is involved in the exploration of relationships in a "set of objects". This is intended to confirm whether or not the data can be represented reliably in a small number of classes of related objects. However, the identification of relevant attributes would precede the identification of relationships among entities.

It should be noted that relationships were not always viewed as important. In the Newtonian model (Wheatley 1993), researchers focussed only on entities, and relationships among the entities were largely ignored. However, in the new science (a phrase used in this thesis to denote the quantum world) it is appreciated that a more comprehensive understanding of a system is gained only when one observes all relationships among the apparently disconnected parts (Wheatley 1993). It follows that when a classification system is developed, the relationships between the different members should be taken into account. This is said mindful of the fact that any such identification of relationships may yield partial results since relationships could be hidden, as pointed out above. The reason for this state of affairs could be because some of the underlying attributes may be unknown at the time the classification is done.

2.6.2 Concepts

One possible definition of a concept is given by Hornby (1981:174) as "an idea underlying a class of things". Concepts are formulated to specify identifiable characteristics (or phenomena) of items (Belkaoui 1987). Observational concepts are those objects that possess specific characteristics which are directly observable (Hempel 1970). A concept may also be seen as a process whereby various phenomena and precepts are identified, classified and interpreted (Caws 1965). A result of the above definition by Hornby (1981) is that a concept may be regarded as essentially synonymous to the semantic content of one or more attributes of the elements belonging to a class.

2.6.3 Change

Classification systems and knowledge interrelate in various ways. This interrelationship can lead to a long linkage of classification systems and knowledge. Sometimes knowledge will change and the underlying classification may have to be adjusted since it may no longer be adequate. In some instances classification may also generate new knowledge (Kwasnik 1999). For example, suppose the cost of stationary for a head office and all regional offices is initially attributed to the budget of the head office. As a result the head office may show a loss while the regions may appear to run at a profit. Suppose further that management decides to embark on a new strategy for allocating cost, based on the activities responsible for the generation of such costs (e.g. an Activity-Based Costing (ABC) model). Subsequently the total cost of stationary may be moved from the head office and split over the regions. As a result the head office could suddenly start showing a profit instead of a loss, resulting in the new knowledge that the head office is actually running at a profit instead of a loss. Refer also to Example 2.1 in this regard.

A great deal of complexity was introduced by the changes that took place during the latter part of the 20th century and the beginning of the 21st century. These changes took place mainly in information technology (IT) and the industrial society (Capra 2002), resulting in people feeling uneasy about change. This uneasiness usually leads to uncertainty in the minds of those affected by a change, often leading to a resistance against such change. Change normally influences communications, energy, healthcare, transportation, economics, entertainment, manufacturing and

warfare (Pressman 2005). Any classification system should be flexible enough to take into account future changes in the system under consideration.

2.7 Multi-disciplinary research

Much about classification may be learned from multi-disciplinary research. Social scientists base their research of businesses on interdisciplinary research, and also make use of multi-disciplinary research, using instruments from more than one discipline (Strother 1962). A discussion of some of this multi-disciplinary research is presented below.

2.7.1 Social sciences and classification

Important subject areas of the social sciences are philosophy and psychology, including (amongst other things) human information processing.

2.7.1.1 Philosophy and classification

Classification and definition are related to each other in the sense that a sensible classification can only be done once correct definitions of the objects to be classified have been given. Such definitions naturally rely on the attributes of the objects under consideration. Classification can be seen as 1) the formation and 2) the location of classes. The location of a class implies that such a class has already been formed (i.e. formation $\Rightarrow$ location, where $\Rightarrow$ denotes logical implication (Ryan, Scapens and Theobald 1992)), but formation can stand alone. Both processes are concerned with indicating similarities and differences among the items to be classified. Location results in the aspect of gradation of information into higher and lower levels, a principle already recognised by Davidson (1887). During classification the similarities and differences of members are taken into account to establish different classes and subclasses. The formation of classes and subclasses should also form part of a classification system for accounting information, e.g. the class of all *Assets* is made up of two subclasses, one of which is *current assets* (see Appendix I). The process of classification in accounting needs to summarise information without losing meaning and has to take relationships among members into account to create the said subclasses.

According to Pauw (2004), accountants are faced with the following questions (amongst others): Is a class a concept, and which rule (i.e. concept) ought to be applied to transactions to place them into classes? This leads to some form of circular argument. In order to address this, the idea of an initial measurement to establish attributes of items prior to classification is proposed in this thesis. Therefore, when a transaction takes place, it is classified according to its attributes. If some of the attributes are not known, a preliminary classification may be done for the transaction. As time passes, however, some of these attributes may become known, leading to a reclassification of the transaction.

Classification is a process of developing groups of (often) varying sizes. Groups with a large number of members tend to lessen the significance conveyed by each member in comparison to a class with a smaller number of elements. The effectiveness of the process of classification lies in the following (Davidson 1887):

1. *Masses of data that is unmanageable and incomprehensible are grouped into classes*. Hence classification becomes an aid to creating knowledge in the sense that the original large group of data is partitioned into different classes, each with a particular purpose, thereby creating information from unstructured data.
2. *Classification alleviates a complexity problem for the human mind.* It is easier to recall the classes formed instead of all the individual members before classification.
3. *Classification facilitates the detection and presentation of "laws of coexistence".* Through the attributes, relationships between members and between classes are discovered and displayed. For example, in accounting, the attributes of a transaction allow it to be classified in the same way as a different transaction with similar attributes.

When grouping items together there should be a "light-giving principle" which leads to a satisfactory classification, otherwise the classification won't be of "any scientific value" (Davidson 1887:239). Unfortunately, classification is much more complex than this simple rule suggests, hence Davidson (1887) continues by arguing that, in order to supply the largest amount of information, classification should be based on the

largest number of related characteristics or attributes. This supports the notion of forming a class of members with the largest number of similar attributes, as long as the attributes in which these members differ are not crucial.

2.7.1.2 Psychology and classification

Psychology offers us vast insights into the behaviour of individuals and since business activities are performed by humans, it follows that psychology has an effect on all areas of accounting practice and theory (Prince 1964). Goldberg (2001:42-43) builds further on this view of human behaviour when he describes classification as a "reflection and an expression of a human attitude; it is a human invention, an artefact as much as any physical tool or instrument, but an artefact of and for the mind". It is plausible, therefore, that classification in accounting may indeed be influenced by human behaviour which may result in different classification frameworks for accounting information.

2.7.1.2.1 Human Information Processing and classification

A growing amount of research is being done using theories and models from the psychology of human information processing (HIP) and, in particular, the science of making decisions (Libby and Lewis 1977). This is of particular interest to the accounting profession since accountants are increasingly faced with decision-making processes (Libby and Lewis 1977). The ability to make quality decisions in accounting is a function of the quality of the underlying classification system used to classify information in financial statements; if the classification system delivers good quality information which is useful, quality decisions may be made.

HIP research has revealed that the ability of humans to process large amounts of information is rather restricted. Individuals make use of a selective and stepwise information processing system (Schroeder, Clark and Cathey 2005:117):

1. *"An individual's perception of information is quite selective".* An individual's perception will be based on their anticipation of what they expect to perceive since they are capable of understanding only a selective part of their surroundings.

2. *"Since individuals make decisions on the basis of a small part of the total information available, they do not have the capacity to make optimal decisions".* If individuals use only a part of the information available to them, their decisions may be subjective since not all the information that may be relevant is used.
3. *"Since individuals are incapable of integrating a great deal of information, they process information in a sequential fashion".* A classification framework that allows an accountant to take the classification of a transaction through a sequence of steps, instead of a set of concurrent actions, may be the way to design a useful classification system for accounting information. Following a sequence of steps is indeed the process advocated in Chapter 7 where a framework for the classification of accounting information is developed.

The tendency of the Financial Accounting Standards Board (FASB) and the SEC (Securities and Exchange Commission) to expect increasingly more information to be disclosed may have the opposite effect of what is planned if the tentative list of conclusions from HIP research above is accurate (Schroeder *et al.* 2005). This viewpoint had already been envisaged by Arthur Anderson & Co. (1976) when they suggested that a hierarchy of information providing users with the amount of information they need, would give only a partial solution to information overload brought about by expanded disclosure. It is important to guard against information overload when a classification system is developed. Rather, a classification framework that allows an accountant to classify a transaction through a sequence of steps, and thereby decrease information overload as a whole, may very well result in a more useful classification of accounting information.

In the following section knowledge creation through classification, i.e. the transformation of data into knowledge as articulated by Kwasnik (1999) is discussed.

2.7.2 Knowledge creation and classification

Knowledge representation and knowledge discovery are based on classification. The process of classification is approached from different sides and classification systems are constructed in different ways. Each type of classification process has its own unique goals and each classification system has its own unique structural properties, strengths and weaknesses (Kwasnik 1999:2). Classifications can be multifaceted or

straightforward, and they can convey much information or only a little (Kwasnik 1999:17). Ultimately, therefore, the classification process may be viewed as a knowledge creating process in accounting.

The following corollary is a direct result of the above discussions on classification:

Corollary 2.1: The process of classification tends to transform a pool of unstructured *data* into a collection of classes such that each class contains useful *information* rather than unstructured data. In essence, therefore, classification results in the creation of new knowledge.

Corollary 2.1 is stated in general terms. In Chapter 3, however, it will be instantiated for the case of accounting information.

2.7.3 Science and classification

The beginning of a scientific activity may be looked upon as the description of phenomena where, after grouping, classification and correlation occur (Simon 1978). Sokal (1974) argues that the purpose of a correct classification is to explain objects in such a manner that their "true" relationships are revealed. The primary objective of classification is to describe a structure in terms of attributes associated with objects and to display the relationships of the essential objects to each other. The purpose is also to express the relationships in easier terms to facilitate the making of general statements about classes and their objects. When developing a classification framework for accounting information, relevant relationships between members and also between classes and subclasses may be displayed to reduce the complexity of the resulting classification system.

2.7.3.1 Logic and classification

The word *logic* stems from Classical Greek "logos". Originally it meant *the word*, or *what is spoken,* but nowadays it means *thought* or *reason* (Wikipedia 2006). It is the study of criteria for the assessment of arguments. Being a formal science, logic investigates and classifies structures (of statements and arguments) through the use of formal systems of inferences. The notation used could be natural language (Ryan *et al.* 1992) or a formal mathematical notation (Hamilton 1991). A fundamental

principle of mathematical logic is that the establishment of classes may be unlimited when based on differences or different attributes (Mill 1862). This may lead to a very complex classification system and, although a classification framework for accounting information may need to take all relevant and known attributes of members into consideration when establishing classes and subclasses, care should be taken not to make the resulting classification too complex. To this end a sequential classification framework may help to cut down on the complexity of the resulting classification.

Copi and Cohen (1990) claim that giving a description of an item is the same process as classifying the item into a class. For example, "to describe a given animal as carnivorous is to classify it as a carnivore; to classify it as a reptile is to describe it as reptilian. To describe any object as having a certain attribute is to classify it as a member of the class of objects having that attribute" (Copi and Cohen 1990:449). However, there is a danger in the above gross equivalence between description and classification drawn by Copi and Cohen: a description of an item is necessarily unique; otherwise one item could not be distinguished from the next. Hence, if description equates to classification, it means that each and every resulting class has one element only, resulting in a situation which does not add any new knowledge to the system, i.e. it contradicts Corollary 2.1 above.

2.7.3.2 Quantum physics and classification

A fundamental law of Newtonian physics states that an object remains at rest or in motion unless an external force of sufficient magnitude works in on it, in which case its state of rest or motion may be altered. Therefore, a relationship exists between an object and a force working in on it. This first law of Newtonian physics still applies in quantum physics (Wheatley 1993). A similar relationship exists in accounting in the sense that a transaction (the external force of sufficient magnitude) may have a cause and an effect (e.g. selling a product for cash) on some accounting entities. It may also have a cause but no effect (e.g. selling a product on credit). In this case the external force has an insufficient magnitude to bring about change. Lastly a transaction may have neither a cause nor an effect, e.g. there is no party external to the company involved. An example is providing for depreciation on an asset.

2.7.4 Auditing and classification

Qualitative conditions that ought to be included where the certainty of one or more assertions cannot be determined can be divided into 1) express and 2) implied conditions. The express conditions are stated explicitly whereas implied conditions are those which are inferred by the classifications and arrangements of financial statements (Mautz and Sharaf 1961). It follows that where there is uncertainty concerning an assertion in the financial statements, the implied conditions may need to be clearly revealed by the classification framework for accounting information, possibly by providing information additional to the financial statements.

The following are some viewpoints from auditing based on classifications in the financial statements (Mautz and Sharaf 1961):

- *Current liabilities grouped together imply they share at least one characteristic.* When classifying *current* liabilities, they need to have at least one attribute that binds them together.
- *Contingent liabilities are classified in a footnote of the balance sheet, implying they have a different likelihood than other items which appear in the statement itself.* Those liabilities that are in conflict with others will not be included in the distributed union minus the conflicting requirements (refer Example 1.1). These conflicting requirements may need to be mentioned as additional information to the financial statements.
- *Expenses and revenues are classified in the income statement which implies that they have qualities that may or may not be articulated in their titles.* Classification of expenses and revenues may need to be revised to make sure that their qualities relate to their titles.

The way in which financial statements are presented, in other words, the way in which information is classified in the financial statements, may withhold useful information from users or mislead them, even though the data is reliable. The presentation of information in the financial statements is based on balance sheet classifications, the way in which unusual gains and losses are classified in the income statement, the disclosure of *contingent liabilities*, the valuation methods in the balance sheet and other similar matters (Mautz and Sharaf 1961). In order to supply

useful information to users of financial statements that does not mislead them, a classification framework for accounting information is needed. For example, currently Research and Development (R&D) expenses are written off in the year they are incurred. However, future benefits may be realised by an R&D exercise. Hence, users may be misled by current accounting practices relating to R&D.

2.8 The role of measurement, risk and uncertainty in classification

In this section issues pertaining to measurements are discussed. Consideration is also given to possible risks and uncertainties involving such measurements.

2.8.1 Measurements

Traditionally *measurement* is described as establishing a measure which yields a *numeric* value as the final answer. This view is echoed by Pressman (2005:466) as he claims that a measure provides "a quantitative indication of the extent, amount, dimension, capacity or size of some attribute of a product or process". However, an enhanced view of measurement is put forward by Riahi-Belkaoui (2004:42): "It is generally considered that accounting is a measurement as well as a communication discipline. By measurement is meant 'the assignment of numerals to objects or events according to rules'. The first step in accounting is to identify and select these objects, activities or events and their *attributes* that are deemed relevant to users before actual measurement takes place". This quote from Riahi-Belkaoui (2004) is significant since it implies that there is an initial step prior to taking any measurement (e.g. the identification of attributes). This idea of a "prior measurement" is taken further in Chapter 3.

2.8.2 Risks

The *risk* involved in the process of discovering measures which have many different attributes is that, unavoidably, the measure will have to satisfy aims that are contradictory (Pressman 2005). This problem is rather similar to the problem of having to decide among contradictory requirements from stakeholders in the process of establishing a classification. In accounting, measures with many characteristics may also be faced with the challenge of attempting to satisfy conflicting measurement needs. An example occurs in the classification of *current/non-current* items when items are grouped together but they are measured differently, for

example, inventory is presented at historical cost, and debtors at cost plus unrealised profit.

2.8.3 Uncertainty

The issue of *uncertainty* is often approached from the well-known uncertainty principle stated by Heisenberg (Wheatley 1993). Heisenberg's *Uncertainty Principle* from Physics states that an observer can measure and get a fix on the *position* of a particle (e.g. an electron in the electron cloud surrounding the nucleus of an atom), or can get a measure of the momentum and thereby observe the *wave* of the same particle, but both these attributes cannot be measured simultaneously (Wheatley 1993). Therefore, any system which displays an analogy with the principles of position and momentum in quantum physics, e.g. a system in which measurement and observation are at stake may very well be influenced by the same uncertainty principle.

Classifying objects into classes necessarily brings about some uncertainty as to the demarcation of the partitions (i.e. classes). This problem is articulated by Reznik and Pham (2001:972) when they write: "Uncertainty is the main challenge for the fusion of a variety of information, both in how to reduce the degree of uncertainty and in how to describe the uncertainty that inevitably remains. The problem of estimating uncertainty (or reliability, imperfectness, impreciseness) of the information source and uncertainty of the information after its propagation and fusion with other information streams has become very important for decision-making in different IT and engineering applications, especially in system design". In the accounting arena, therefore, it follows that two different accountants may indeed produce two different classifications of accounting information even if they have to classify the information for the same purpose, e.g. decision usefulness. As before, the only viable option in the case of such disagreement appears to be the removal of conflicting requirements from a distributed union of all requirements as illustrated in Example 1.1.

2.9 Summary and conclusion

In this chapter some classification perspectives from a general point of view were addressed. As a process of the mind, classification is located in the right hemisphere of the brain where the grouping of items takes place. The historical origin of

classification has its roots in the works of the Greek philosopher Aristotle (382 to 322 BC) whose classification system was based on nature. Classification is defined as the process of placing items with similar attributes and relationships in the same class. Items that are placed in the same class may still have fundamental differences, according to which they may be further defined, i.e. a specialisation of the class into various subclasses. A discussion based on the concepts of classification was divided into the purpose of classification and the properties of a generic classification.

The role of relationships in classification was also discussed. Relationships that exist among classes stem from the attributes of objects that belong to a class. It was found that concepts should be formulated to specify identifiable characteristics or phenomena. Classification and change are interrelated; when the one changes the other will follow and has to be adjusted. Multi-disciplinary research has shed some light on classification in general. Uncertainty coupled with subsequent risks may affect classification and the information portrayed in the classification.

A final, important conclusion of this chapter is that classification is often performed to create knowledge and thereby transform an unstructured collection of data into a number of structured classes, each class containing useful information. This idea is captured in Corollary 2.1.

While the current chapter addressed a number of generic issues in classification, the next chapter addresses a specialisation area of classification, namely, the classification of accounting information, which is the topic of this thesis.